

## REMARKS

The applicant appreciates the Examiner's thorough examination of the application and requests reexamination and reconsideration of the application in view of the preceding amendments and the following remarks.

The Examiner rejects claim 36 under 35 U.S.C. §112, first, stating that the specification fails to disclose a second fluid or vapor (delivered) to the substrate.

The applicants' specification discloses that process gases are injected by the delivery/exhaust nozzle assembly 20. See the applicants' specification at page 10, lines 2-3. It is one object of the invention to provide a wide variety of gas chemistries for many different types of surface processes. See the applicants' specification at page 5, lines 18-20. Also, it is known in the art that in reactors, surface processes are performed in reaction chambers where high energy and gas mixtures are combined to produce a reaction. See the applicants' specification at page 2, lines 22-23. The applicants' specification further discloses one embodiment in which a gas injection module delivers at least one reactant gas and at least a second fluid or vapor to the substrate surface. See the applicants' specification at page 8, lines 12-15.

Accordingly, there is sufficient support in the application for the elements of claim 36, and the applicants request that the Examiner withdraw the rejection of claim 36 under 35 U.S.C. §112.

The Examiner also rejects claims 1, 7-13, 17-20 and 24-28 under 35 U.S.C. §103(a) as being unpatentable over U.S. Pat. No. 6,090,458 to *Murakami* in view of U.S. Pat. No. 6,190,458 to *Harada*. The Examiner further rejects claims 2 and 4-6 under 35 U.S.C. 103(a) as being unpatentable over *Murakami* in view of *Harada* and further in view of U.S. Patent

No. 5,814,156 to *Elliot et al.* The Examiner further rejects claim 3 under 35 U.S.C. §103(a) as being unpatentable over *Murakami* in view of *Harada* and further in view of U.S. Patent No. 4,624,330 to *Schmidt et al.* The Examiner further rejects claim 14 under 35 U.S.C. §103(a) as being unpatentable over *Murakami* in view of *Harada* and further in view of U.S. Patent No. 5,002,631 to *Giapis et al.* The Examiner also rejects claim 23 under 35 U.S.C. §103(a) as being unpatentable over *Murakami* in view of *Harada* and further in view of U.S. Patent No. 6,374,770 to *Lee et al.*

The applicants' claim 1 as amended recites a scanning plasma reactor for exciting or ionizing reactant gases with UV radiation at a substrate surface including a beam forming module to transform a UV radiation source raw output into a rectangular beam, a gas injection module to deliver at least one reactant gas to the substrate surface, and a reaction chamber with a UV window through which the beam forming module projects the rectangular beam. A vacuum chuck holds the substrate. A gas exhaust module inside the chamber removes reaction by-products and unreacted reactant gas from the substrate surface. The gas injection module and the gas exhaust module are in close proximity to the rectangular beam, and the rectangular beam, the gas injection module and the gas exhaust module are moveable relative to the reaction chamber and the substrate surface.

As the Examiner admits, *Murakami* fails to teach that the gas exhaust module is inside the chamber. The Examiner therefore points to *Harada* as teaching a gas module 111 located inside the chamber and combines it with *Murakami* to reject claim 1.

In contrast to the applicants' amended claim 1, however, *Harada* teaches that the gas exhaust module 111 is not moveable relative to the reaction chamber. Instead, *Harada* teaches that exhaust module 111 is fixed in place. See e.g. *Harada* at column 7, lines 36-39.

This is the exact opposite of the applicants' claim 1. Also, in direct contradiction to the applicants' claim 1, *Murakawi* does not teach gas injection or gas exhaust modules. Instead, *Murakawi* teaches ports to the chamber, such as port 102. Moreover, even the ports taught by *Murakawi* are fixed and not moveable relative to the chamber.

Thus, even the combination of *Murakami* and *Harada* fails to teach each of the elements of the applicants' claim 1.

The Examiner cites *Cates et al.* to reject other claims, but the applicants will address *Cates*' teachings in light of claim 1 as amended.

The Examiner states in pertinent part that *Cates et al.* teaches a beam, a gas injection module and a gas exhaust module moving across a stationary substrate surface by means of a robotic positioner, in order to move the processing region along a desired path of the substrate surface.

In contrast to *Murakawi* and *Harada*, *Cates et al.* does not teach a chamber at all. *A fortiori*, since there is no chamber, *Cates et al.* does not teach the applicants' claimed elements which are missing from the teachings of *Murakawi* and *Harada*, i.e. a beam and modules moveable relative to a reaction chamber.

The Examiner further states that:

... the purpose [of] *Cates et al.* was simply to demonstrate that it is known in the art to use a moving mechanism to move a beam forming module, a gas injection module, and an exhaust module ... the motivation to combine *Murakawi* in view of *Harada* and *Cates* is to move the processing region along a desired path of the substrate surface.

Such a motivation to combine only exists in hindsight. *Cates et al.* does not suggest that the robotic arm can or should be used in a chamber which forms part of a plasma

reactor. In fact, *Cates et al.* teaches quite the contrary, namely, a material removal process and system to remove coatings from bridges, aircraft, automobiles and ships. See *Cates et al.* column 1, lines 6-21. It is not obvious to squeeze bridges and ships -- or the mechanism to remove coatings from them -- into a plasma reaction chamber.

Moreover, “reducing a claimed invention to an ‘idea’, and then determining patentability of that ‘idea’ is error ... Analysis properly begins with the claims, for they measure and define the invention”. See *Jones v. Hardy*, 727 F.2d 1524, 220 USPQ 1021, 1024 (Fed. Cir. 1984).

The applicants’ claims must be analyzed -- not the “idea”, e.g. of moving modules.

Also, the Examiner has cited no evidence of knowledge generally available to one of ordinary skill in the art other than the *Cates et al.* reference itself, and as noted, *Cates et al.* offers no suggestion that its coating removal system for massive objects without a chamber should or could be used in a plasma reaction chamber. In fact, *Murakawi* and *Harada* themselves provide evidence a lack of suggestion or motivation to combine these references with *Cates et al.* (and thus the inventiveness of the applicants’ claimed invention). The teaching of *Cates et al.* was available to both *Murakawa* and *Harada* long before the filing of *Murakawa* or *Harada*.

“There must be a reason or suggestion in the art for selecting the procedure used, other than the knowledge learned from the applicants’ disclosure”. See *In re Dow Chemical Company*, 837 F.2d 469, 473, 5 USPQ 2d 1529, 1532 (Fed. Cir. 1989).

In this case, it is clear that there is such no reason or suggestion other than the applicants’ disclosure.

Accordingly, the applicants’ claim 1 is in condition for allowance. Claims 2-14, 16-

20, and 23-27 depend directly or indirectly from claim 1, and thus are also in condition for allowance for at least the foregoing reasons.

Claim 28 has been cancelled.

The Examiner also rejects claim 29 under 35 U.S.C. 103(a) as being unpatentable over *Murakami* in view of *Harada* and further in view of U.S. Pat. No. 5,174,826 to *Mannava et al.*

Claim 29 as amended recites, *inter alia*, a beam forming module to output a rectangular beam, a gas injection module to deliver at least one reactant gas, a reaction chamber, a gas exhaust module, that the rectangular beam and the at least one reactant gas form a reaction zone at or near the substrate surface, the reaction zone moveable relative to the reaction chamber and the substrate.

In sharp contrast, *Murakami* teaches that the point where the beam meets the substrate -- if that point were considered, *arguendo*, to be a “reaction zone” -- is fixed relative to the chamber because the substrate moves while the beam and ports remain stationary. *Harada*’s supply and exhaust pipes 47 and 49, as well as the gas feeder 102 and exhauster 111 are fixed in place. Additionally, the wafer is moved into place by descending mechanism 33, but the “reaction zone” between the wafer and the glass plate 46 is not moveable relative to the reaction chamber and the substrate. *Mannava et al.* teaches fixed vacuum line 48 and gas line 52. The point where the beam meets the substrate -- if that point were considered, *arguendo*, to be a “reaction zone” -- is fixed relative to the chamber. See e.g. *Mannava et al.* Fig. 2.

Thus, neither *Murakami*, *Harada*, *Mannava et al.* nor their combination teach each of the elements of the applicants’ claim 29. Accordingly, claim 29 is in condition for

allowance.

The Examiner further rejects claims 16 and 34-36 under 35 U.S.C. §103(a) as being unpatentable over *Murakami* in view of *Harada* and further in view of U.S. Patent No. 5,204,517 to *Cates et al.*

Claim 16 depends from claim 1 and thus is allowable for at least the reasons above with respect to claim 1.

Claim 34 recites, *inter alia*, that the gas injection module and the gas exhaust module are in close proximity to the rectangular beam, and wherein the rectangular beam, the gas injection module and the gas exhaust module are movable inside said chamber relative to the substrate surface and said chamber. Claim 35 recites, *inter alia*, that the gas injection module is in fixed proximity to the rectangular beam and the gas injection module and the rectangular beam are movable relative to the substrate surface and the chamber.

As noted above with respect to claim 1, without the benefit of hindsight, without a suggestion or motivation in the references to combine *Murakami*, *Harada* and *Cates et al.*, and without other evidence, these cited references fail to teach that the gas injection module and the gas exhaust module are movable inside said chamber relative to the substrate surface and said chamber. Accordingly, claims 34 and 35 are also in condition for allowance.

Claim 36 recites, *inter alia*, that the rectangular beam and the at least one reactant gas form a reaction zone at or near the substrate surface, the reaction zone movable relative to the reaction chamber and the substrate and wherein the gas exhaust module is moveable with the reaction zone. For at least the reasons discussed above with respect to claim 29 regarding the reaction zone, claim 36 is also in condition for allowance.

Additionally, for at least the reasons discussed herein with respect claims 1, 29 and 34-36, new claim 37 is also in condition for allowance.

Finally, the applicants traverse the Examiner's contention that *Murakami* teaches a rectangular beam. The Examiner cannot turn *Murakami*'s spot beam with a diameter -- see *Murakami* column 7, lines 44-48; column 7, lines 30-35; column 10, lines 9; column 3, lines 29-32 -- into a rectangle. Not even with the thinly veiled invocation that *Murakami* (perhaps) could have, which invocation is made without any evidence, or teaching, or motivation, or desirability, or effect, on the part of *Murakami* or anyone else. Also, the applicants' claims recite a rectangular beam, which is the pertinent subject of analysis. In any event, neither applicants' schematic Fig. 2 nor the specification show or disclose that the beam starts out rectangular and then narrows into a single point.

To advance prosecution, however, the applicants have amended claims as set forth and discussed above.

### CONCLUSION

Accordingly, claims 1-14, 16-20, 23-27, 29, 34-36 and new claim 37 are in condition for allowance.

Each of Examiner's have been addressed and/or traversed. Early and favorable action is respectfully requested.

If for any reason this Response is found to be incomplete, or if at any time it appears

that a telephone conference with counsel would help advance prosecution, please telephone the undersigned or his associates, collect in Waltham, Massachusetts at (781) 890-5678.

Respectfully submitted,

A handwritten signature in cursive script, appearing to read "T. Thompson".

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Thomas E. Thompson, Jr.  
Reg. No. 47,136